DISTRACTED DRIVING: Exploring Data Analysis Using Multi- Attribute Task Battery II (MATB-II)

Javornda Ashton
Gliziel Gonzales
Northumberland High School

- Grade Level: 9-12
- Students will need an understanding of statistics and data analysis.
- How to represent data graphically using Microsoft Excel.

Overview of Lesson

- Trial 1: Driving (MATB only)
- Trial 2 : Driving While Texting

Statistical Glossary

The Absolute Value of the Vertical Pixel and Horizontal Pixel offsets from the Center Point are added and the sum squared

RMSD-C is the Root Mean Square Deviation from the Center Point in Pixel Units

RMSD-C = Square Root (SS / NUM)

SESSION_TIME= 15 second intervals during simulation

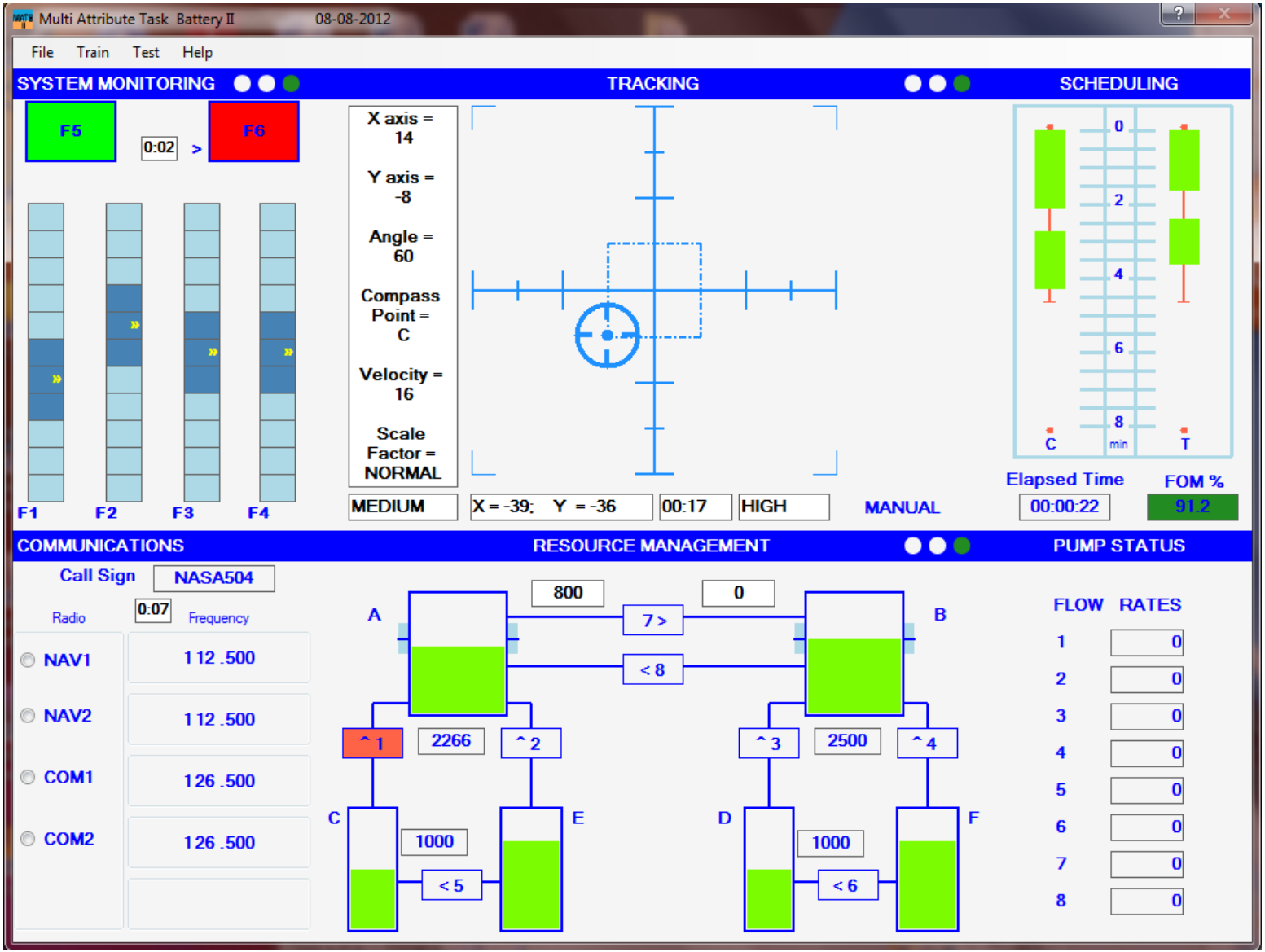
INT_NUM= Interval Number of Samples

RUN_SUM OF SQUARES= sum of squares

SS = Sum Of Squares; NUM = Number of Samples

RUN_NUMBER OF SAMPLES= cumulative sum of INT_NUM

MATB-II


Multi Attribute Task Battery II
08-08-2012
File
Train
Test
Help
SYSTEM MONITORING
TRACKING
SCHEDULING
F5
0:02
F6
F1
F2
F3
F4
X axis = 14
Y axis = -8
Angle = 60
Compass Point = C
Velocity = 16
Scale Factor = NORMAL
MEDIUM
X = -39; Y = -36
00:17
HIGH
MANUAL
Elapsed Time
00:00:22
FOM %
91.2
C
min
T
COMMUNICATIONS
RESOURCE MANAGEMENT
PUMP STATUS
Call Sign
NASA504
Radio
0:07
Frequency
NAV1
112.500
NAV2
112.500
COM1
126.500
COM2
126.500
800
0
7 >
< 8
A
B
^1
2266
^2
^3
2500
^4
C
E
D
F
1000
< 5
1000
< 6
FLOW RATES
1 0
2 0
3 0
4 0
5 0
6 0
7 0
8 0

Configuration of MATB-II

Video inserted here

e Train Test Help

STEM MONITORING | TRACKING | SCHEDULING

F5 F6

F2 F3 F4

X axis = 0

Y axis = 0

Angle = 0

Compass Point = C

Velocity = 0

Scale Factor = NULL

MEDIUM | 00:00 | HIGH

MANUAL

0 2 4 6 8 min

C T

Elapsed Time 00:00:07

FOM %

MMUNICATIONS | RESOURCE MANAGEMENT | PUMP STATUS

Call Sign NASA504

Radio	Frequency
NAV1	112.500
NAV2	112.500
COM1	126.500
COM2	126.500

A B C D E F

800 0

7 > < 8

^1 2500 ^2

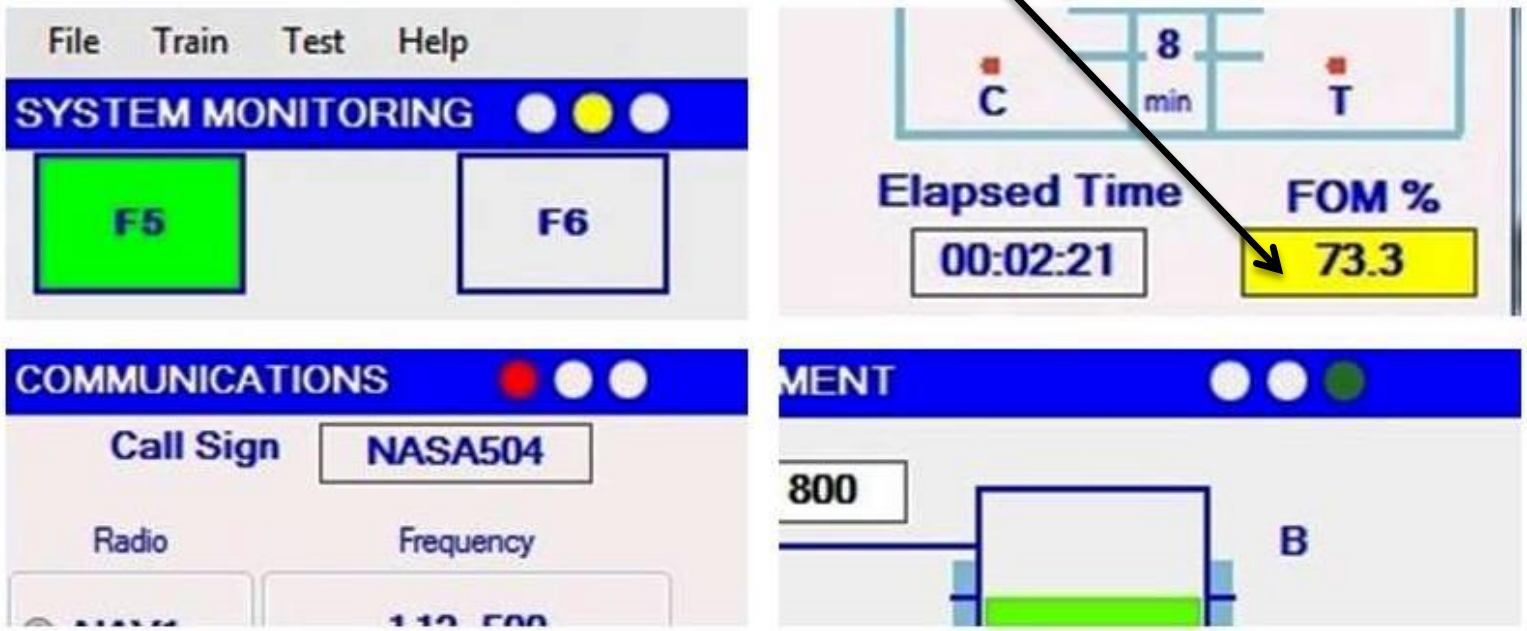
^3 2500 ^4

1000 < 5

1000 < 6

FLOW	RATES
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0

Figure of Merit



Driving errors

This frequency table is used for Trial #1 only

Student Driving Error w/o distractions	Frequency
System Monitoring: Running Traffic light	
Tracking Task: Driving off Course	
Communications: Making a wrong Turn	

- Output Data

This is how the output data will appear for both Trial #1 and Trial #2

SESSION_TIME	INT_NUM	RUN_SUM_OF_SQUARES
0:15	368	624844
0:30	366	1310098
0:45	368	5601442
1:00	364	8999305
1:15	368	9492065
1:30	368	12146654
1:45	366	16896236
2:00	366	21997194

- Generate Calculations in Excel

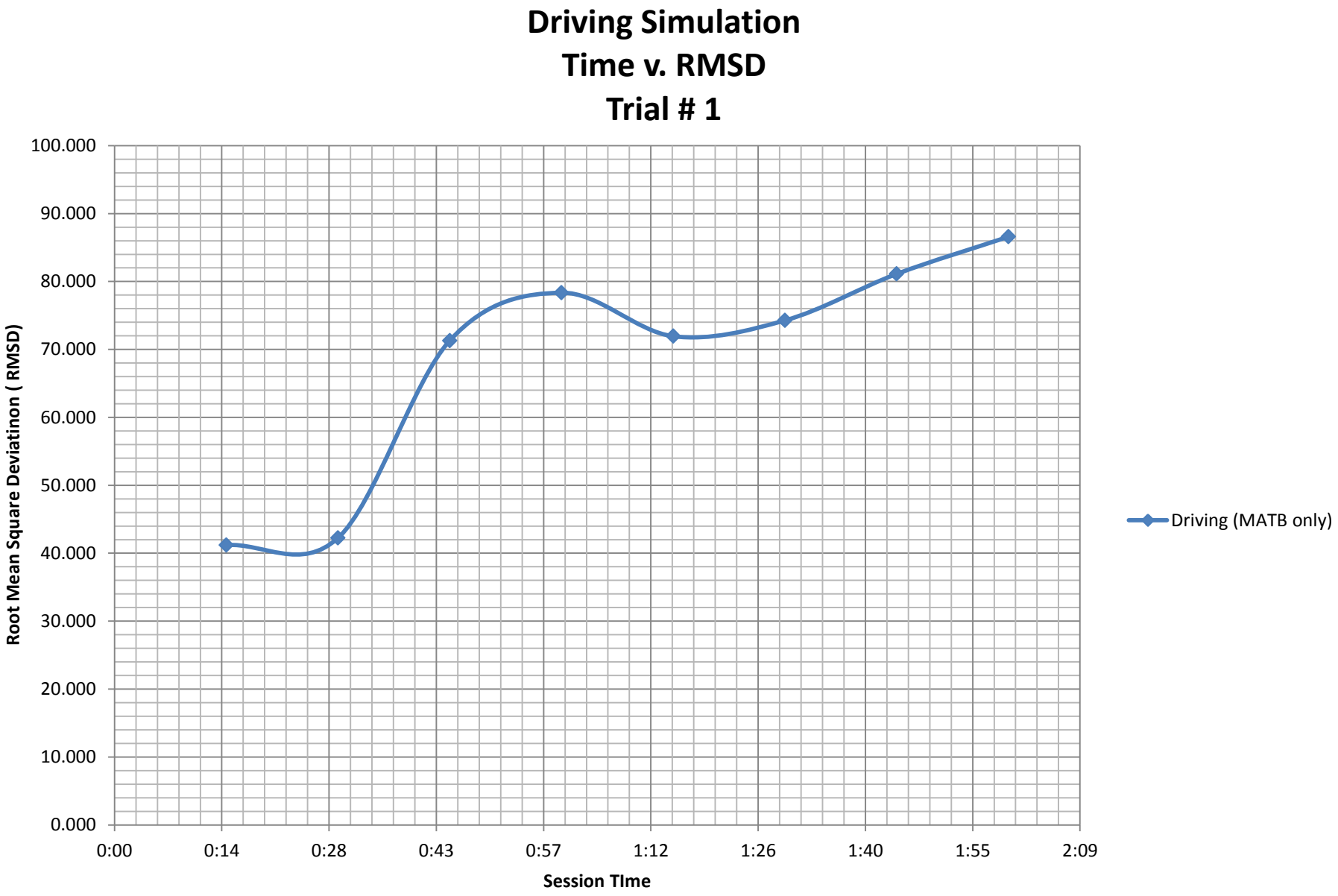
RUN_NUMBER OF SAMPLES = cumulative sum of INT_NUM

RMSD-C is the Root Mean Square Deviation from the Center Point in Pixel Units
RMSD-C = Square Root (SS / NUM)

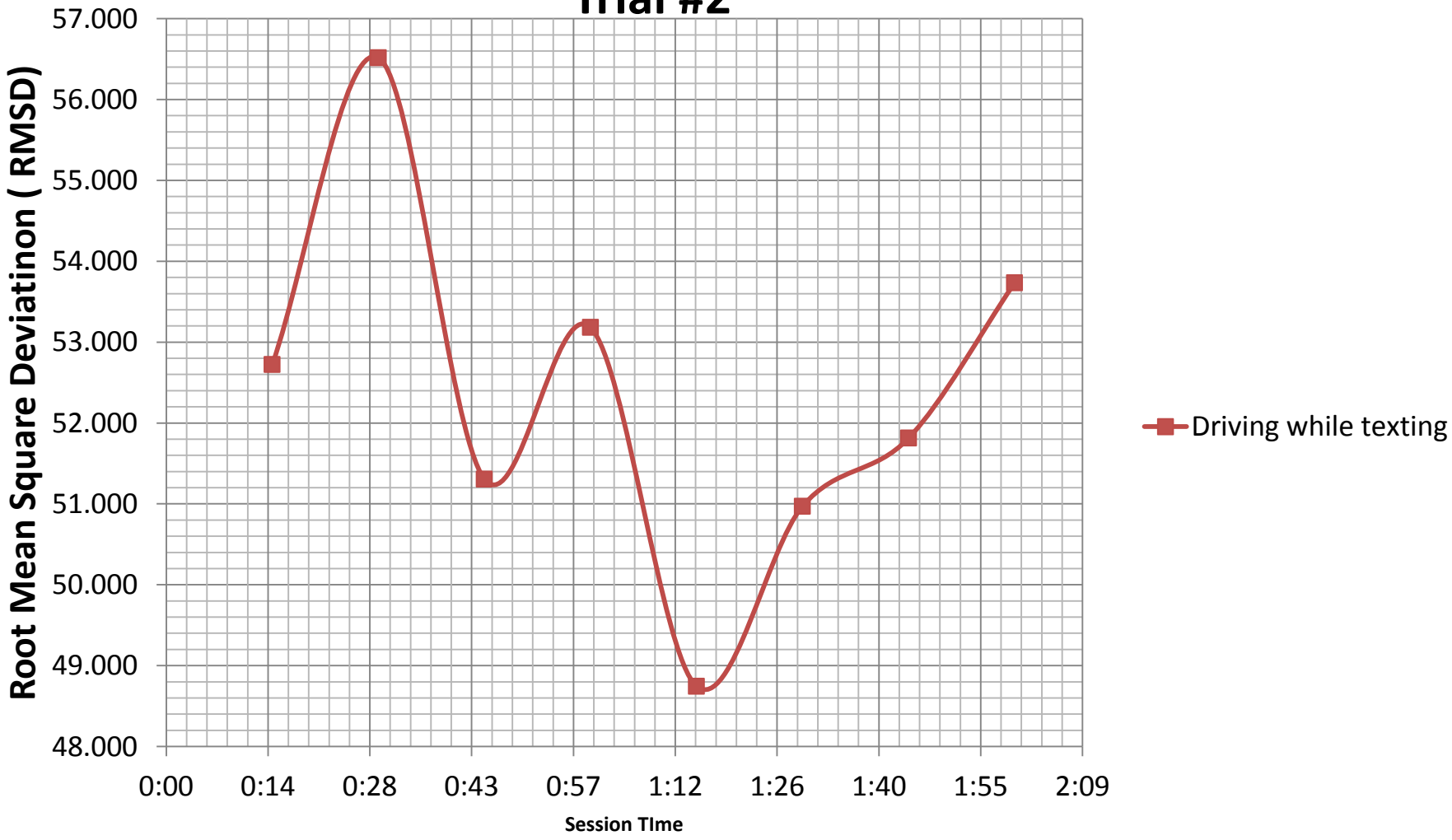
SESSION_TIME	INT_NUM	RUN_NUM	RUN_SUM_OF_SQUARES	RUN_RMSD_C
0:15	368		624844	
0:30	366		1310098	
0:45	368		5601442	
1:00	364		8999305	
1:15	368		9492065	
1:30	368		12146654	
1:45	366		16896236	
2:00	366		21997194	

Driving Simulation: Time v. RMSD of Trial #1 & Trial #2

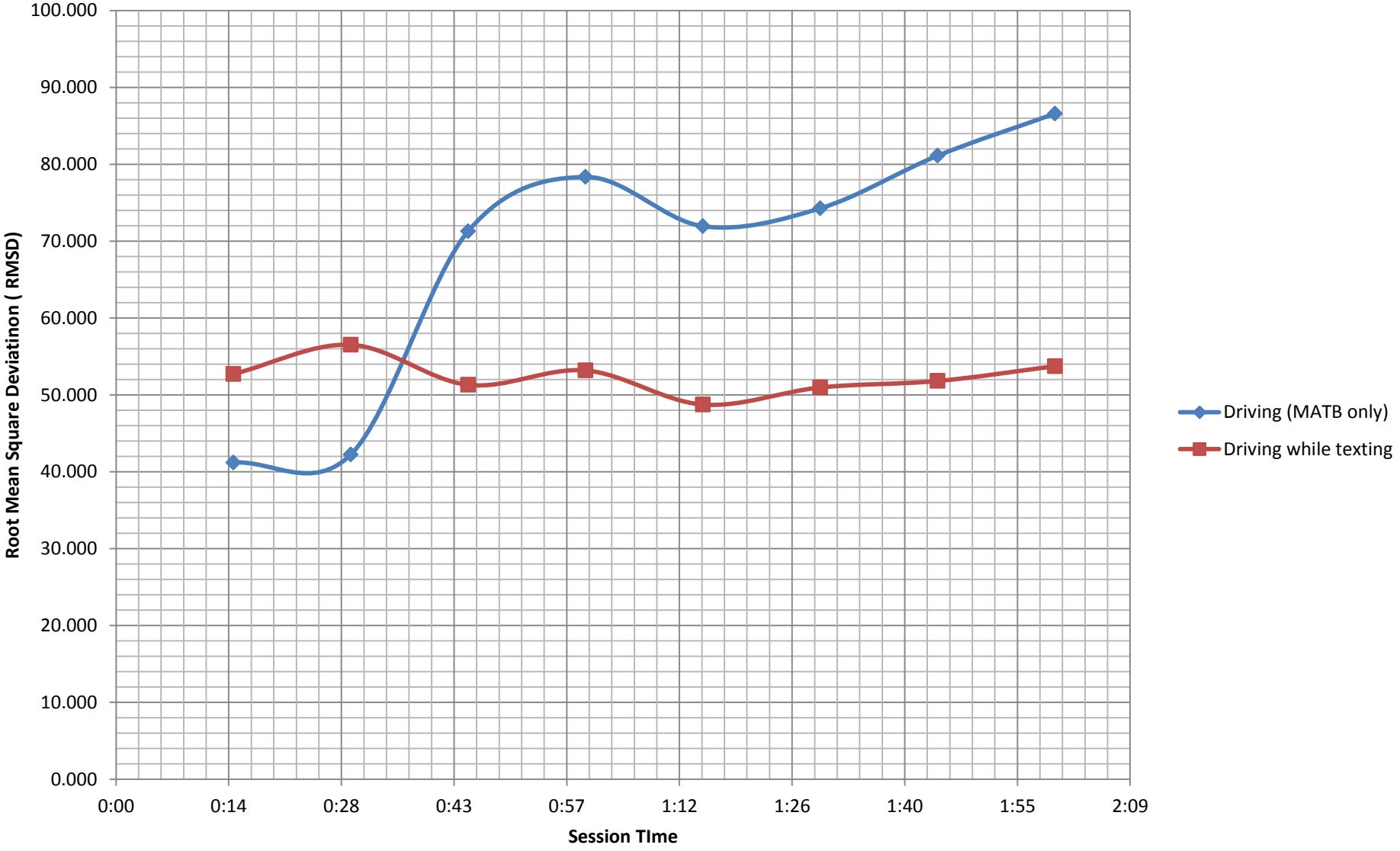
	Trial #1	Trial #2
SESSION_TIME	RUN_RMSD_C	RUN_RMSD_C
0:15	41.206	52.722
0:30	42.248	56.518
0:45	71.295	51.307
1:00	78.350	53.183
1:15	71.942	48.746
1:30	74.271	50.972
1:45	81.114	51.814
2:00	86.587	53.734


Driving Simulation
Time v. RMSD
Trial # 1
Root Mean Square Deviatinon (RMSD)
100.000
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
0:00
0:14
0:28
0:43
0:57
1:12
1:26
1:40
1:55
2:09
Session TIme
Driving (MATB only)

Driving Simulation
Time v. RMSD
Trial #2

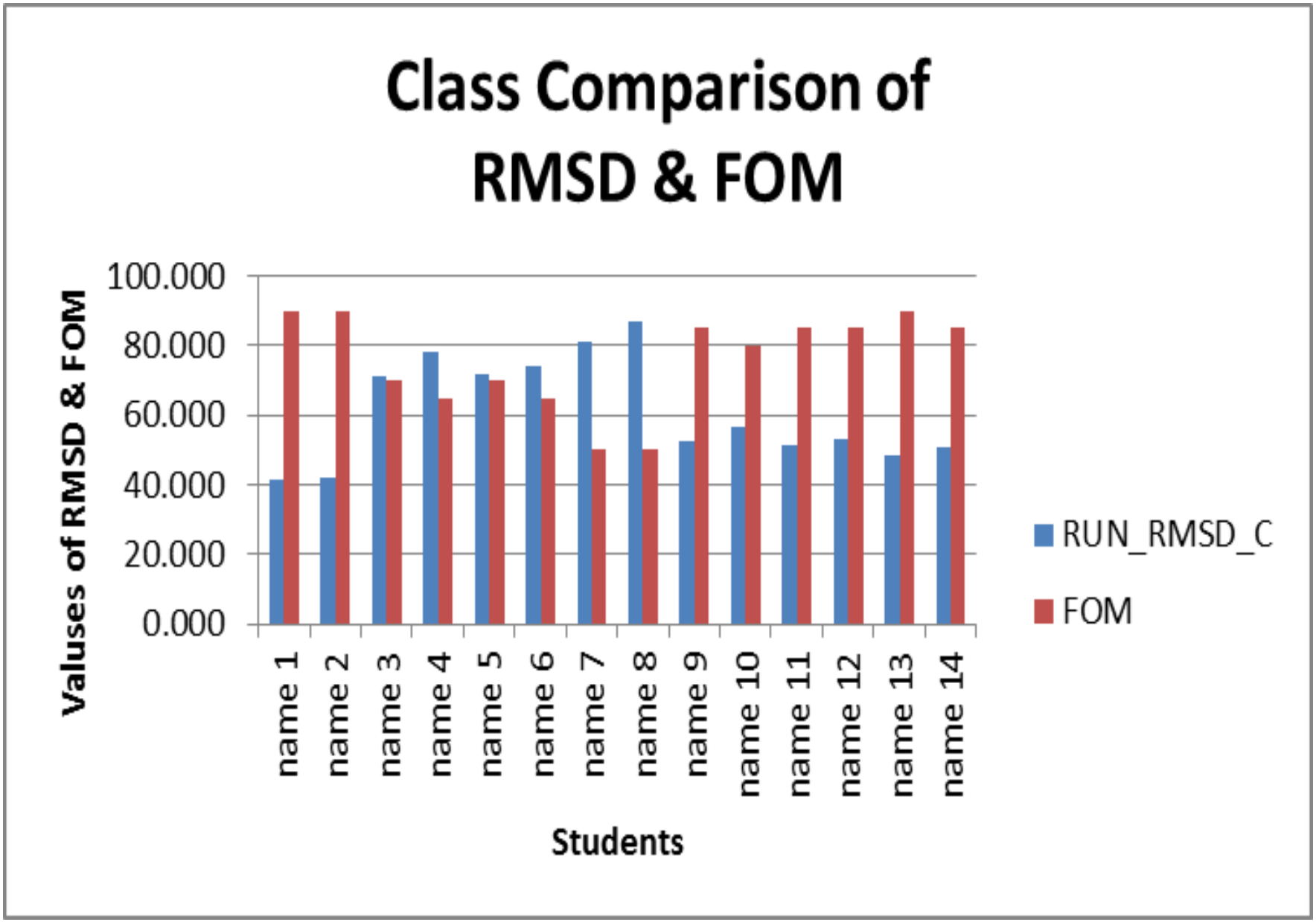


Driving Simulation
Time v. RMSD



Class Comparison
RMSD v. FOM

Student Name	RUN_RMSD_C	FOM
name 1	41.206	90.000
name 2	42.248	90.000
name 3	71.295	70.000
name 4	78.350	65.000
name 5	71.942	70.000
name 6	74.271	65.000
name 7	81.114	50.000
name 8	86.587	50.000
name 9	52.722	85.000
name 10	56.518	80.000
name 11	51.307	85.000
name 12	53.183	85.000
name 13	48.746	90.000
name 14	50.972	85.000


Class Comparison of RMSD & FOM
Valuses of RMSD & FOM
100.000
80.000
60.000
40.000
20.000
0.000
name 1
name 2
name 3
name 4
name 5
name 6
name 7
name 8
name 9
name 10
name 11
name 12
name 13
name 14
Students
RUN_RMSD_C
FOM

Assessment

- Workload Rating Scale Self-evaluation rubric **(see handout # 6)** Handout6.docx

- Data Analysis Rubric **(see handout # 7)** Handout7.docx

- Visit the website www.nasa.gov for the latest information on NASA
- Access to MATB- II software: Go to http://matb.larc.nasa.gov-

Contact Information
Javornda Ashton
Mathematics Teacher
Northumberland High School, Heathsville, Virginia
Email: jashton@nucps.net

Gliziel Gonzales
Mathematics Teacher
Northumberland High School, Heathsville, Virginia
Email: ggonzales@nucps.net